Elastic and Shear thinning instabilities for the flow of polymer solutions through microtubes BIDHAN CHANDRA, VISWANATHAN SHANKAR, Indian Institute of technology Kanpur — It is well known that the flow of dilute polymer solution through tubes undergoes a non-linear subcritical transition at Re slightly higher than 2000. However, when the polymer concentration is increased beyond a threshold concentration, the instability occurs at a Re much lower than 2000. The instability occurring at Re lower than 2000 at higher polymer concentration (hence higher elasticity) is a linear instability. A recent article by Poole, 2016, shows that if the polymer solution prepared is sufficiently shear thinning in nature, an instability occurs at very low inertia (Re~50). We explore the possibility of very low Re instability for the flow of concentrated polymer solutions through micro-tubes. High concentration of polymer solution coupled with small tube diameters enable us to reach high elasticity numbers. We observe that the polymer solution destabilize at very low Re (Re~10). The nature of instability is also observed to be very different as compared to elasto-inertial instability as observed from the scaling relationships.

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